ANNO NOKI, OR BUSHI: THE ARROW POISON OF THE AINUS.

BY

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By Edward T. Reichert, M.D.,
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Dwelling upon the island of Yezo is a tribe of about seventeen thousand Ainus, the probable descendants of the ancient aborigines of the Japanese Empire. Conquered and reduced to slavery by the Japanese, they retain only the appearance of self-government, and many of their peculiar customs have been suppressed or abolished. They, like so many barbarians, especially those inhabiting tropical countries, have from time immemorial prepared virulent poisons with which they charged their weapons of the chase and warfare. The formulæ for the preparation of these poisons, as in the case of most of the arrow poisons of other tribes, are known to only certain members, and the secret is passed down from generation to generation as an heirloom, as it were. This possession naturally carries with it a certain degree of importance, so that among some of these people such individuals are distinguished by peculiar insignia, as in the New Hebrides, where it is stated that the femoral bone of the pig is worn on the forearm. Some of these poison-makers even claim to be able to prepare antidotes not only for their own poison, but also for those of certain other tribes.

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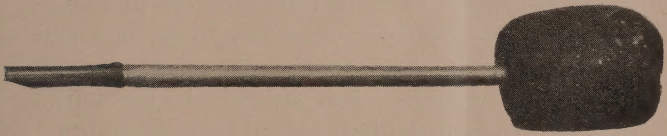
Arrow poisons not only vary considerably in their composition, physiological properties, and lethal power, but each kind is in some way or ways more or less peculiar to the tribe making it. Snake venom, venomous spiders, poisonous caterpillars, putrid flesh, etc., are used by some, alone or in combination with other poisons. Generally, however, they are of plant origin, and for the most part they are inspissated extracts of species of strophanthus, strychnos, amyrillis, and euphorbia, to which various substances are sometimes added, but without, as a rule, modifying to any important degree the lethal properties of the basic constituent. Species of strophanthus and strychnos are extensively used. Most of the well-known African arrow poisons, including the kombé of North Africa, the arquah of the Niger, the inèe of the Gaboon, and the waniki of Zanzibar, are believed to be obtained from species of strophanthus; while the poisons of the South American Indians, and of some of the savages of Borneo, are from species of strychnos. The toxic principle of the kenyah dart poison ipoh has been shown by Seligmann to be antiarin. The poison is an inspissated sap of the antiaris toxicaria. The Bushman sometimes makes use of extracts of the amyrillis or euphorbia, with which venom is mixed; and certain of the North American Indians employ snake venom, etc. The poisons yielded by the several families of plants mentioned not only differ widely in their physiological properties and killing power, but the preparations by the same tribe vary considerably in toxicity, and some or all of them deteriorate with age, so that the practice of making fresh preparations annually is universal.

Extremely little is known of anno noki, and owing to the Japanese prohibitory law forbidding its preparation, it is now made only surreptitiously, and it can be obtained only with great difficulty. Dr. H. M. Hiller, of Philadelphia, during his recent travels in the East, was so fortunate as to secure a fresh specimen, which was transmitted to Dr. S. Weir Mitchell, through whose courtesy I have been enabled to make a brief study of its characteristics. This specimen is in the form of a short cylinder with rounded ends, 35 mm. long and 26 mm. in diameter, and supported on a stick 150 mm. long (see figure). When fresh it was soft enough to be readily indented with the finger-nail, but after several months' exposure to the air it has become hard and difficult to cut, and shrunken. The blob when fresh weighed about 50 grammes. The outer surface varies in color from a light buff to a shade bordering on a black; and the inner portion from a light buff to almost a black, the lighter color predominating. The mass upon cross-section has an appearance which suggests that an extract has been made which, after having undergone evaporation to the proper consistency, has been rolled out into a cylindrical mass without any attempt being made to obtain a homogeneous mixture, and then the end of the stick thrust in, with the probable purpose of suspending the mass for further drying. Microscopically, it consists almost wholly of minute, clear granules which give a blue



reaction with iodine, which therefore may be regarded as starch. Mixed with these are some large starch granules, a few plant cells, fibrous matter, and other foreign particles. When rubbed up with water a glutinous mixture is formed, and both the aqueous and aqueous-alcoholic filtrates are poisonous. While very little is known of anno noki there can be no doubt that it is derived from one or more species of aconite. Dr. Eldredge, of Yokohama, found that the killing power depends upon aconite; Dr. Kingo Miyabe informed Dr. Hiller that the source of the poison is the aconitum frischeri reich; and the Ainus told Dr. Hiller of several formulæ, all of which show that aconite is at least the main constituent. The following account condensed from the formula given by Batchelor is generally believed to be the method employed: The roots of aconite plants are dug up in the spring and peeled, and put in the sun to dry. When thoroughly dried they are ground to a powder between two stones. Some tobacco and capsicum are then soaked in water, and when well-macerated the powdered aconite is moistened with the liquor, to which is then added a little foxes' gall. It is then again put to dry, and again wetted with the liquor, but this time some of the compounders add a poisonous spider. Some of them bury the poison for a few days. According to this formula, anno noki is essentially a powdered aconite, but microscopic examination shows it to be an inspissated extract.

The results of the experiments that I have made upon dogs leave no doubt as to the killing power of the ainu poison being due to aconite. The symptoms caused by a subcutaneous injection of an aqueous or aqueous-alcoholic filtrate do not differ in any important particular from those following the injection of the official tincture of aconite root. Thus, in an experiment upon a dog weighing 6 kilos, the aqueous filtrate from 0.5 gramme of anno noki was injected subcutaneously in two doses, one-third being injected at 10.48 A.M., and the remainder at 11.15 A.M., and the following were the chief phenomena noted: 11.25 A.M., dilatation of the pupils, slight general inco-ordination, tremors, stiffness, restlessness; pulse full and less frequent; reflexes appear to be somewhat exaggerated; volitional movements resemble those of a dog slightly under the influence of alcohol. 11.35 A.M., retching, tremors more marked, stiffness has passed to rigidity, inco-ordination markedly increased, sensitivity to pain and tactile impressions decidedly lessened, inco-ordination and rigidity increased when volitional movements are attempted, apparently fully conscious, defecation attended by marked rigidity and inco-ordination. 11.45 A.M, lies quiet, weak, and collapsed for a time, and then stirs about with difficulty, owing to the rigidity, inco-ordination and affection of sensitivity; pulse frequent and irregular; respiration less frequent, deep, and labored; retching occurs at intervals, and has so increased in intensity that during the later paroxysms the animal is literally thrown from his feet in emprosthotonus; occasionally he whines, as though in pain, yet his responsiveness to pinching and other forms of mechanical irritation shows that his sensitivity is far below the normal. 12 M., lies collapsed; respirations are infrequent, shallow, and whining; pulse frequent, weak, and irregular. 12.03 P.M., respiratory movements ceased; heart continues beating very feebly, and is finally arrested in diastole.

Essentially the same picture is produced by the subcutaneous injection of 2 to 3 c.c. of tincture of aconite.

In experiments in which the effects upon the circulation were studied in animals rendered motionless by curare, I have not noted any important differences from the typical phenomena recorded by experimenters in their studies with aconite. The arterial pressure falls, this effect being preceded or interrupted by a slight and transient rise above the normal. After a time the pressure undergoes considerable fluctuations, during which period it may go beyond the normal—in one experiment it went 32 mm. above this level. The primary rise is doubtless of vasomotor origin, inasmuch as it is not accompanied by corresponding changes in the heart's action; but the subsequent increase which occurs during the period of pressure fluctuation is due probably solely to actions upon the heart by which the mechanism of the beat is so disarranged that the viscus is in a state of delirium. The pulse is at first full and regular, but less frequent; it becomes arrhythmic during the period of pressure fluctuation; and finally it is frequent, feeble, and more or less irregular. The heart's action is always arrested in diastole. In one experiment the heart suddenly ceased beating when the pressure was 88 mm., and the beat 78 and full. In other experiments of this series the heart-beat was suddenly arrested at a time when the arterial pressure was as high as one-third of the normal, indicating the action of a treacherous heart poison.

I have not detected any evidence of the presence of tobacco, capsicum, venom, or poison other than aconite. The foregoing facts leave no reasonable doubt that the arrow poison of the ainus is essentially or solely an inspissated extract of the aconitum frischeri reich.

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